***Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ P: \_\_\_\_\_\_\_***

CW #30

Find Perimeter and Area of Complex Figures

**MEA501**: Compute the area of triangles and rectangles when one or more additional steps are required.

# Objective(s):

4.3 Find the area of complex figure by adding areas

4.4 Find the area of complex figure by subtracting areas

**“ATTACH” Areas**

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| **Example 1:** An open envelope has the dimensions shown below (in inches). What is the area of the opened envelope?  5 3 5      4 4  4 4 | **Example 2:** The figure below is a hexagon, and ABCD is a rectangle that is contained in that hexagon. All measurements on the figure below are in centimeters. What is the area of the entire hexagon?  A 5 B  4 4  6 4 4 6    4 C 5 D 4 |
| 1. Find the area of the figure below. | 2. *ABDE* is a square with a side length of 9 units. If  *ED* = *DC*, what is the area of?  9  *A*  *E*  *D*    *C*  *B* |
| 3. A new basketball gym is being built at a local community center. The gym is to have a volleyball court and a basketball court. If the volleyball court needs be 60 feet by 30 feet, and the basketball court needs to be 90 feet by 50 feet, how many square feet will be contained within the new gym? | 4. Find the area of the figure below. All measurements are given in feet. |
| **Remember:** Circularshapes have a in their area formula, so there is an \_\_\_\_\_\_\_\_\_\_\_\_\_ as well as an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ final answer for their area. Note how this will play out with a complex area:  **Area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – Area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = Area of shaded region**  Example of exact answer: \_\_\_\_\_\_\_\_\_\_\_ Example of approximate answer: \_\_\_\_\_\_\_\_\_\_\_ | |
| **Example 3:** A football stadium is being built and the builders need to determine the perimeter of the entire building. The stadium is built as a rectangle with two half-circles on either end. The stadium is 90 yards long and 60 yards wide. What is the area, in square feet, of the football stadium? | 5. A new racetrack is being designed and will be composed of a long rectangle with a semi-circle on each of the shorter sides as shown in the diagram below. All measurements are given in yards. What is the area of the racetrack?  75  20 |

**“CUT OUT” Areas**

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| **Example 4:** In the figure below, all angles are right angles. Find the area of the shaded region.  28 in    24 in  12 in 12 in  24 in    20 in    16 in 16 in    28 in | **Example 5:** An 8-foot by 10-foot floor is tiled with square tiles that are 1-foot by 1-foot. Each tile has a pattern consisting of four white quarter circles of radius ½-foot centered at each corner of the tile. The remaining portion of the tile is shaded. How many square feet of the ﬂoor are shaded?  [Description: unitsize(2cm);defaultpen(linewidth(.8pt));fill(unitsquare,gray);filldraw(Arc((0,0),.5,0,90)--(0,0)--cycle,white,black);filldr...](http://www.artofproblemsolving.com/Forum/code.php?hash=381ecd9559f5d996f7caf7f6fecd26658fa8a3ec&type=2&sid=eb935c0cb94c70b42c029924b25cf412) |
| 6. Jose wants to redecorate his room. On one wall he wants to put up new wallpaper. The wall is a 13-by-11 foot rectangle and has a door which takes up a 7-by-3-foot rectangular area. After the area of the door is subtracted, how many square feet of wall remain to be covered?   1. 28 2. 48 3. 122 4. 143 5. 288 | 7. Find the area of the shaded region. |

Note: There is often more than one way to solve a complex area problem. Take a look at the example below and solve using all three methods provided. You will not always be told when to use addition and when to use subtraction on a problem! You must be a problem solver and decide the best operation given the scenario!



**Independent Practice or Whiteboards**

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| 1. A swimming pool is going to be built in a backyard that is 20-by-40 feet. The swimming pool is going to be a perfect circle with a radius of 15 feet. Calculate the remaining area of the backyard that is going to be cemented. | 2. Find the area of the figure below. |
| 7. The page of a book measures 8 inches by 6 inches. There is one inch of white space around the text in every direction. How many square inches of text are on each page?   1. 20 square inches 2. 24 square inches 3. 28 square inches 4. 35 square inches 5. 48 square inches | 8. Find the area of the figure below. |
| 14. Find the area of the shaded region if the radius of the circle is 6 in. | 10. A cut is made from the bottom of a 6 foot by 10 foot rectangle so that it leaves a 1 foot strip along the remaining sides as shown in the diagram below. What is the area of the remaining portion of the rectangle?  10 ft.  6 ft.  1 ft. |
| 16. Find the area of the shaded region. All measurements are given in cm. | 13. How many 1 foot by 1 foot tiles would be needed to cover the following room and hallway? The measurements are 13 feet by 11 feet and 20 feet by 17 feet.   1. 143 tiles 2. 260 tiles 3. 340 tiles 4. 447 tiles 5. 483 tiles |
| 15. A 6ft by 8ft rectangular floor is to be covered with tiles. In each of the four corners will be placed one patterned 2ft by 2ft tile. The remaining part of the floor is to be covered with solid white 1ft by 1ft tiles. How many of the solid white tiles will be needed to cover the remaining portion of the floor?   1. 44 2. 40 3. 32 4. 16 5. 12 | 17. Find the area of the shaded region. All measurements are given in inches. |

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| 18) In the figure below, two white congruent circles just fit into the gray circle. What is the area that appears gray?  4 in  10 cm | 19) The square tile shown below has painted corners in the shape of congruent 45-45-90 triangles.  2  x   1. Find x. 2. Find the area of the tile. 3. Find the perimeter of the tile. |
| 20) What is the area of the figure shown below?  25 in  10 in  60 | 21) In the figure below, ABCD is a square. Points on each pair of adjacent sides of ABCD are connected to form 4 congruent right triangles with one leg two times as long as the other, as shown below. What fraction of the area of square ABCD is shaded?  A  D  2x  B  C  x |
| 22) The figure below is a square. The diagonal has a length of 14 cm. What is the area of the square? |

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| 23) In the figure below, the rectangle is 19 cm by 25 cm. The shorter leg of the right triangle is 15 cm. What is the perimeter of the figure?  19  25  15  19 | 24) Find the area of the shaded region.  10 cm |
| **Challenge:**  **25**) In the quadrilateral ABCD shown below, the side lengths are as shown. If the area of ABCD is 128 square units, what is the value of x?  A  B  C  D  4x  7x  5x  4x | |